

## REAPPEARANCE OF THE VANISHING WILD BUCKWHEAT: A STATUS REVIEW OF *ERIOGONUM EVANIDUM* (POLYGONACEAE)

NAOMI S. FRAGA, ELIZABETH KEMPTON, LEROY GROSS AND DUNCAN BELL  
Rancho Santa Ana Botanic Garden, 1500 North College Avenue, Claremont, CA 91711  
nfraga@rsabg.org

### ABSTRACT

*Eriogonum evanidum* Reveal is an annual herb in the buckwheat family that is endemic to southern California, USA and northern Baja California, Mexico. It was described by James Reveal in 2004 and was determined to be extinct due to the lack of recent observations and accessioned specimen collections. During field surveys conducted in 2007 and 2008 this species was rediscovered across its known range in southern California. Three of 10 historic occurrences that were presumed extirpated were located. One new occurrence was documented in the vicinity of Holcomb Valley, San Bernardino Mountains, CA. Location and habitat information are provided and the current conservation status of this species is discussed.

Key Words: California, conservation, *Eriogonum*, endemic, extinct, Polygonaceae, rare, rediscovery.

*Eriogonum evanidum* Reveal (vanishing wild buckwheat) is an annual herb in the buckwheat family (Polygonaceae) that was recently described (Reveal 2004; Fig. 1). This species was given the common name ‘vanishing wild buckwheat’ because it was presumed extinct due to the lack of recent observations and herbarium specimen records (Reveal 2005; CNPS 2011). Focused surveys were conducted by botanists at Rancho Santa Ana Botanic Garden (RSABG) in late summer and fall of 2007 and 2008 to locate *E. evanidum* across its known range in southern California, USA. *Eriogonum evanidum* was found to be extant across its historic range within the United States, although the status of this species in Baja California, Mexico is unknown. Although several occurrences were located, it is likely that some occurrences have been extirpated (Fig. 2). Details of the 2007 and 2008 field surveys are discussed here, including additional information on distribution, habitat, and conservation status.

### TAXONOMIC AND COLLECTION HISTORY

*Eriogonum evanidum* was discovered during herbarium studies by Reveal (2004). The new species was described from specimens that were previously identified as *Eriogonum foliosum* S. Watson. In his description, Reveal (2004) stated that “this distinctive species has been hidden quietly under *Eriogonum foliosum* S. Watson awaiting rediscovery of an extant population so that it might be more precisely characterized than possible from dried material.” Reveal designated a holotype that was collected in 1902 (Abrams 2894) and paratypes collected from as early as 1893 (Alderson 399) to 1967 (Ziegler s.n.). Based on accessioned herbarium specimen records examined by Reveal (2004), it appeared that

most of the documentation for *E. evanidum* took place between 1920 and 1940, primarily from the vicinity of Big Bear Valley in the San Bernardino Mountains of southern California (Reveal 2004; Table 1); an area that has experienced substantial development over the last century. *Eriogonum evanidum* was “presumed extinct” in the Flora of North America (Reveal 2005) and considered “possibly extirpated” in the second edition of the Jepson Manual (Baldwin et al. 2012), although Reveal has reported seeing specimens of the *E. evanidum* that were collected in the late 1990’s (Costea and Reveal 2011). Two specimens that were not cited in the original description, and therefore not likely viewed prior to its description, are housed at RSA and were collected in 1976 (Davidson 4471) and 1994 (Hirshberg s.n.).

### FIELD SURVEY METHODS

Surveys for *E. evanidum* were conducted by botanists at RSABG using a focused, or intuitive-controlled, field survey method (USDA FS 2005), which targets habitats with the highest potential for locating target species at the appropriate time for proper identification. Herbarium specimen records (RSA, UCR), databases (CalFlora, Consortium of California Herbaria, and California Natural Diversity Database), and literature reports were used to identify historic populations of *E. evanidum* and these were targeted for field surveys. Surveys by botanists at RSABG were conducted during August 2007, and August and September of 2008. U.S. Department of Agriculture (USDA) Forest Service Element Occurrence forms were used to document all populations of *E. evanidum* that were encountered (e.g., exact location, population status, existing or potential threats or disturbances, habitat, associated





FIG. 1. *Eriogonum evanidum* in flower with a fisher space pen (9.6 cm  $\times$  0.8 cm) for scale.

species). Herbarium specimens were collected and deposited at the RSA herbarium and photographs of plants were contributed to the CalPhotos database (calphotos.berkeley.edu). USDA Forest Service Element Occurrence forms, along with U.S. Geologic Survey (USGS) maps of surveyed populations, were submitted to the California Department of Fish and Game (CDFG), and USDA Forest Service. Plant identifications were made using taxonomic keys and descriptions in *The Jepson manual: higher plants of California* (Hickman 1993), *A flora of southern California* (Munz 1974), and *Flora of North America* (Reveal 2005). Identifications were verified through comparison with annotated specimens in the RSA herbarium.

#### DISTRIBUTION

In the United States, *E. evanidum* is restricted to southern California and has been documented in the San Bernardino Mountains in San Bernardino County, San Jacinto Mountains in Riverside County, and the Laguna Mountains in San Diego County (Fig. 2). *Eriogonum evanidum* has also been reported from northern Baja California, Mexico (Costea and Reveal 2011).

Occurrences previously documented in the vicinity of Big Bear Lake and Baldwin Lake in the San Bernardino Mountains were not found in 2007 or 2008. It is possible that these occurrences have been extirpated due to development in the region (Table 1).

There are three occurrences in southern California that are doubtful and not supported by herbarium specimens (Table 1). These include reports from Valencia in Los Angeles County, Warner Springs in Riverside County, and Viejas Mountain in San Diego County (CNPS 2011; CNDDDB 2011). The only source for the reported occurrence at Valencia in Los Angeles County is a report prepared by Dudeck and Associates (unpublished) to the CDFG and Newhall Land and Farming Company (CalFlora 2011; CDFG 2011). The population at Warner Springs was referenced by Reveal (1989) in his treatment of *E. foliosum*. The source for the occurrences at Viejas Mountain is from Craig Reiser's 1994 account in *Rare Plants of San Diego County* (CNDDDB 2011). None of these occurrences has been verified in the field, and none are documented by herbarium specimens. In addition, all three are reported at lower elevations than vouchered occurrences and therefore they may lack suitable habitat (Table 1). Future surveys should be conducted to verify if *E. evanidum* occurs at these locations.

#### HABITAT

In previous floristic treatments, habitat for *E. evanidum* was described as sandy to gravelly flats and slopes, in sagebrush communities, oak woodland and montane conifer woodlands at 1150–2300 meters in elevation (Reveal 2005; CNPS 2011; Costea and Reveal 2011; Fig. 3). The described habitat requirements were substantiated while conducting surveys, except that plants were not found in oak woodland. Oak woodland vegetation was presumably included in the habitat description because of the previous reference of this species at Warner Springs in Riverside County. Occupied habitat for *E. evanidum* included sandy soils derived from decomposed granite, in primarily full sun with little to no leaf litter, on a flat aspect in sagebrush scrub dominated by *Artemisia tridentata* Nutt. The sagebrush community was often surrounded by coniferous forest dominated by *Pinus jeffreyi* Balf. or *P. ponderosa* P. Lawson & C. Lawson. *Eriogonum evanidum* was also observed to occur in dry meadows dominated by *Artemisia tridentata* in Holcomb Valley, San Bernardino Mountains, CA.

The following is a list of species associated within *E. evanidum* compiled from several locations throughout its range (\* denotes not native species): *Artemisia tridentata*, *Astragalus douglasii*



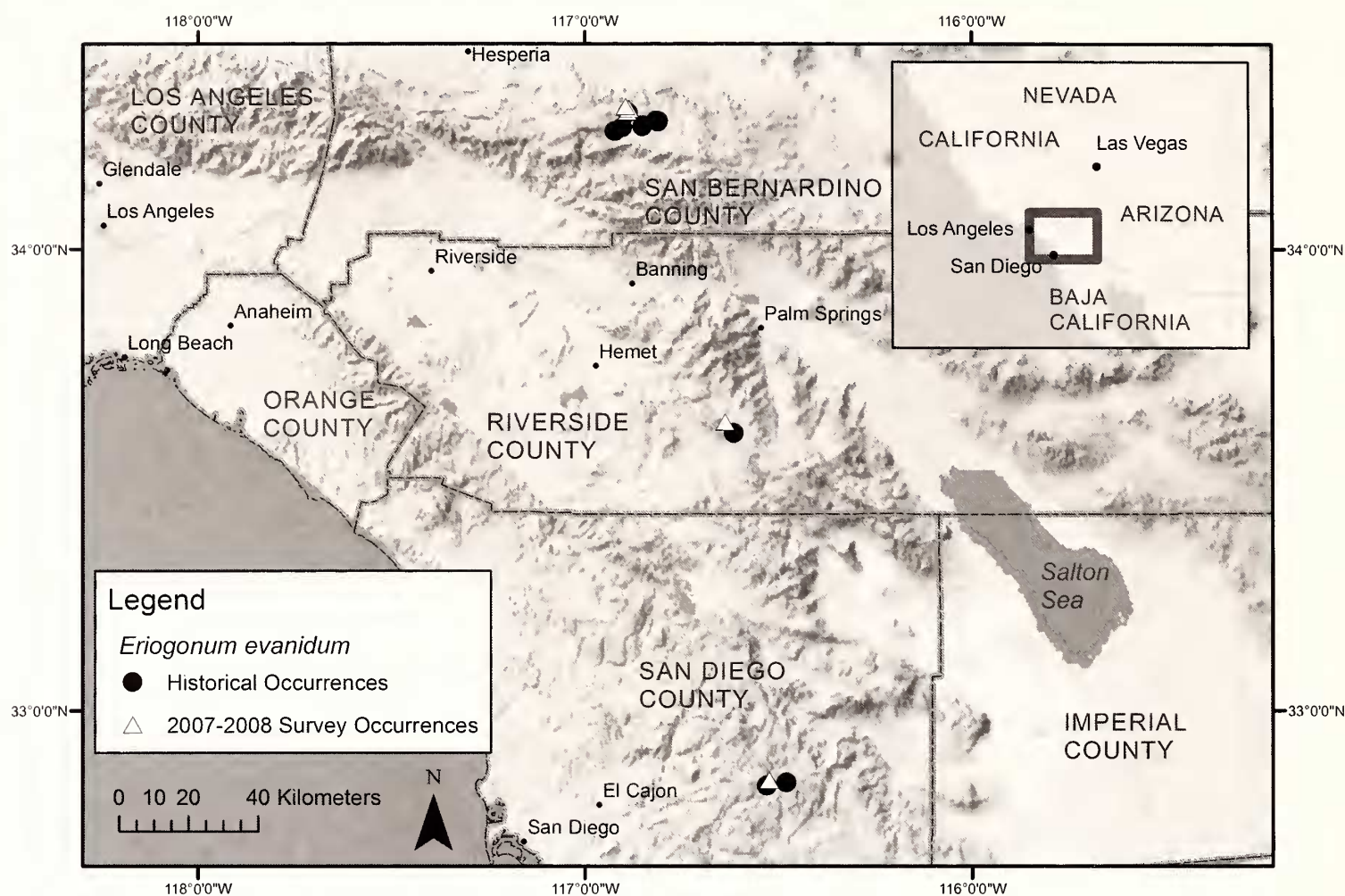


FIG. 2. Distribution of *Eriogonum evanidum* based on vouchered occurrences. Historic occurrences are represented by a black circle and occurrences located in 2007 and 2008 are represented by a white triangle. See Table 1 for detailed information (source herbaria, collection date, locality, etc.) for each occurrence.

(Torr. & A. Gray) A. Gray var. *parishii* (A. Gray) M. E. Jones, *\*Bromus tectorum* L., *Castilleja cinerea* A. Gray, *Chenopodium leptophyllum* (Moq.) Nutt. ex S. Watson, *Chrysothamnus viscidiflorus* (Hook.) Nutt., *Cryptantha micrantha* (Torr.) I. M. Johnst., *Gutierrezia sarothrae* (Pursh) Britton & Rusby, *Ericameria pinifolia* (A. Gray) H. M. Hall, *Eriogonum baileyi* S. Watson, *E. davidsonii* Greene, *E. wrightii* Torr. ex Benth. var. *subscaposum* S. Watson, *Eriastrum sapphirinum* (Eastw.) H. Mason, *Lessingia glandulifera* A. Gray, *Nicotiana attenuata* Steud., *Penstemon centranthifolius* (Benth.) Benth., *Pinus jeffreyi*, *P. ponderosa*, *\*Sisymbrium altissimum* L., *Stephanomeria exigua* Nutt., and *Trichostema micranthum* A. Gray.

#### IDENTIFICATION

*Eriogonum evanidum* co-occurs with other annual taxa in the genus *Eriogonum* that it may be confused with including: *E. baileyi*, *E. davidsonii*, and *E. gracile* Benth. *Eriogonum evanidum* can be distinguished from these species by its relatively small flowers (0.8–1.2 mm), outer perianth lobes that are more or less hastate in fruit, and stems that are tomentose. In contrast *E. baileyi* has flowers that are 1.5–3 mm, the outer perianth lobes oblong to oblong-obovate, generally constricted near middle, and stems are glabrous or tomentose. *Eriogonum davidsonii*

has flowers that are 1.5–2 mm, the lobes are oblong-obovate, and stems are glabrous. *Eriogonum gracile* has flowers that are 1.5–3 mm, the lobes are lanceolate to oblong, and stems are generally tomentose, or sometimes glabrous (Baldwin et al. 2012).

Although not co-occurring within the United States, there are two additional species (*E. foliosum* and *E. hastatum* Wiggins; both endemic to Mexico) that may be confused with *E. evanidum* in Baja California, Mexico. *Eriogonum evanidum* can be distinguished from both of these species on the basis of several morphological characters—both *E. foliosum* and *E. hastatum* have sprawling habits, foliaceous inflorescence bracts, and elliptic basal leaves while *E. evanidum* has an erect habit, scalelike inflorescence bracts, and broadly ovate to orbicular or reniform basal leaves.

#### CONSERVATION STATUS

*Eriogonum evanidum* is not listed by the State of California or Federal government as threatened, or endangered, but is considered by the California Native Plant Society as “seriously endangered in California” (California Rare Plant Rank 1B.1; CNPS 2011). *Eriogonum evanidum* is also on the Sensitive species list for the Cleveland and San Bernardino National Forests. Presumably several populations have been extirpated in

TABLE 1. REPORTED LOCATIONS FOR *ERIOGONUM EVANIDUM* IN THE UNITED STATES. Herbarium acronyms: SD = San Diego Natural History Museum, RSA = Rancho Santa Ana Botanic Garden, JEPS = Jepson, UC = University of California Berkeley, POM = Pomona College. CDFG = California Department of Fish and Game. County Abbreviations: SD = San Diego, RIV = Riverside, SBD = San Bernardino. Other abbreviations: SBM = San Bernardino Mountains, E = Possibly Extirpated.

Source	Date last collected	CO.	Elev. (m)	Location	Notes
SD22661, RSA741151, RSA393366, SD114052, RSA597761	25-Aug-08	SD	1160	Laguna Mountains N end of Pine Valley.	A portion of this occurrence was extirpated due to housing development (CCH 2011)
Reveal 2004 RSA190624, RSA735612	NONE 16-Sep-08	SD RIV	975 1365–1402	Warner Hot Springs San Jacinto Mountains Garner Valley. W side of, and close to Highway 74.	Not verified
Rare Plants of San Diego (Reiser 1994)	NONE	SD	548	Alpine	Not verified
RSA392669, POM2334, POM155993	5-Aug-1902	SBD	2100	SB Mountains, Bear Valley.	E, Development
POM193462	5-Oct-1929	SBD	2134	SBM Along stream south of Peter Pan Woodland Club, Bear Valley.	E, Development
JEPS57523, UC501513	3-Aug-1931	SBD	2100	SBM, flat above Big Bear Lake (Lundy's Landing).	E, Development
RSA723043, RSA393122	14-Aug-07	SBD	2224	SBM Upper section of Van Dusen Canyon. Along Caribou Creek. About 3 mi from Highway 38.	
RSA735660, RSA735665, RSA735465, RSA735656	20-Aug-08	SBD	2225–2236	SBM Caribou Creek meadow. E of Holcomb Valley Campground.	
POM172771, POM193239, RSA65979	23-Aug-1929	SBD	2073	SBM, Baldwin Lake.	Not in CNDDDB, not relocated in 2008, but possibly extant
UCR125005	7-Sep-1931	SBD	2058–2073	SBM between Big Bear Lake and Baldwin Lake	E, not in CNDDDB
CDFG	1-Sep-2006	LA	356	Entrada site, Valencia	Not verified





FIG. 3. Typical habitat for *Eriogonum evanidum*. Photo from Pine Valley, San Diego County, CA.

the vicinity of Big Bear Lake and possibly Baldwin Lake due to development in the region. In addition, one population in Pine Valley has been extirpated due to development; Hirshberg revisited a population she previously documented in 1994 and states that “there is now a house there, and the population has apparently been extirpated” (CCH 2011). The primary threats to this species include development, dispersed recreation (vehicle use off designated roads, hiking, equestrian use, etc.), and non-native plant establishment (CNPS 2011).

#### SURVEY RESULTS

There are ten documented locations of *E. evanidum* (Fig. 2); four of these are known to be extant (Table 1). Several occurrences in the vicinity of Big Bear Lake and Baldwin Lake were not located and are possibly extirpated (Table 1). One historic occurrence in the San Jacinto Mountains in Garner Valley (Hemet Valley), one historic occurrence in the Laguna Mountains in Pine Valley, and one occurrence in the San Bernardino Mountains along Van Dusen Canyon Road were located. An occurrence in the vicinity Holcomb Valley in the San Bernardino Mountains was newly documented as a result of this study (Table 1). There are several reported locations for which there are no voucher

specimens (Valencia, Warner Springs, and Alpine, Table 1), therefore the existence of these occurrences is suspect until verified. In 2008 a survey was conducted at Warner Springs and no suitable habitat found.

#### DISCUSSION

There are several factors that may have influenced the lack of recent documentation for this species and previous conclusion that this species was extinct. First, *E. evanidum* has a highly limited distribution, only occurring in localized microsites within its distribution, and is generally not locally common. Second, this species commonly occurs in the general vicinity of similar looking species (e.g., *E. baileyi*, *E. davidsonii*). Third, *E. evanidum* has exceedingly small flowers and therefore diagnostic characteristics can be difficult to detect in the field. Lastly, *E. evanidum* flowers from August to September, a time of year when few botanists make collections. Other summer to fall-blooming plants, such as *Deinandra mohavensis* (D. D. Keck) B. G. Baldwin have been mistakenly considered extinct (Sanders et al. 1998). This brings to bear the importance of collecting plant specimens late in the growing season in the summer and fall months.

There are undoubtedly additional occurrences of *E. evanidum* that have not been documented



and we recommend additional surveys are conducted to further assess the status of this species. The status of CNPS list 1B.1 is appropriate given the current information. All extant occurrences are known from National Forest lands, and are therefore currently protected from development; however, this species may also be present in undocumented locations on private property. While *E. evanidum* is extant throughout its current range within the U.S., this species has been impacted by anthropogenic disturbances (e.g., dispersed recreation, OHV use, development). Specifically plants in Pine Valley in San Diego County have been impacted by development. This was noted by Hirshberg (CCH 2011) who was unable to locate an occurrence she previously documented because it has been extirpated by development (CCH 2011). The conservation status of *E. evanidum* was brought to light because it was presumed extinct in recent floristic treatments; if not for these recent publications, this species could have remained undetected and hidden in herbaria.

#### ACKNOWLEDGMENTS

This project was supported by the USDA Forest Service (San Bernardino and Cleveland National Forests). We wish to thank Scott Eliason, Melody Lardner, and Lisa Young for logistical support.

#### LITERATURE CITED

- BALDWIN, B. G., D. H. GOLDMAN, D. J. KEIL, R. PATTERSON, T. J. ROSATTI, AND D. H. WILKEN, (eds.) 2012. The Jepson manual: vascular plants of California, 2nd ed. University of California Press, Berkeley, CA.
- CALIFORNIA DEPARTMENT OF FISH AND GAME (CDFG). 2011, Biological resources technical report for the Entrada Site, Los Angeles, County, California. Website: <http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentVersionID=21408> [accessed December 1, 2011].
- CALIFORNIA NATIVE PLANT SOCIETY (CNPS). 2011, Inventory of rare and endangered plants (online edition, v7-10c). California Native Plant Society, Sacramento, CA. Website: <http://www.cnps.org/cnps/rareplants/inventory/> [accessed November 11, 2011].
- CALIFORNIA NATURAL DIVERSITY DATABASE (CNDDDB). 2011, RareFind 4.0. California Department of Fish and Game, Sacramento, CA. Website: <https://nrmsecure.dfg.ca.gov/cnddb/view/query.aspx> [accessed November 11, 2011].
- CALFLORA: INFORMATION ON CALIFORNIA PLANTS FOR EDUCATION, RESEARCH AND CONSERVATION [WEB APPLICATION]. 2011, The Calflora Database [a non-profit organization], Berkeley, CA. Website: <http://www.calflora.org/> [accessed: November 11, 2011].
- CONSORTIUM OF CALIFORNIA HERBARIA (CCH). 2011, Consortium of California Herbaria Search Page. Consortium of California Herbaria, Berkeley, CA. Website: <http://ucjeps.berkeley.edu/consortium/> [accessed November 11, 2011].
- COSTEA, M. AND J. L. REVEAL. 2011. *Eriogonum*. In The Jepson eFlora. Website: <http://ucjeps.berkeley.edu/IJM.html> [accessed November 11, 2011].
- HICKMAN, J. C. (ed.). 1993. The Jepson manual: higher plants of California. University of California Press, Berkeley, CA.
- MUNZ, P. A. 1974. A flora of southern California. University of California Press, Berkeley and Los Angeles, CA.
- REVEAL, J. L. 1989. The eriogonoid flora of California (Polygonaceae: Eriogonoideae). *Phytologia* 66:295–414.
- . 2004. New entities in *Eriogonum* (Polygonaceae: Eriogonoideae). *Phytologia* 86:121–159.
- . 2005. *Eriogonum*. Pp. 221–430 in Flora of North America Editorial Committee (eds.), Flora of North America North of Mexico, Vol. 5: Magnoliophyta: Caryophyllidae, part 2. Oxford University Press, New York, NY.
- SANDERS, A. C., D. BANKS, AND S. BOYD. 1998. Rediscovery of *Hemizonia mohavensis* Keck (Asteraceae) and addition of two new localities. *Madroño* 44:197–200.
- UNITED STATES DEPARTMENT OF AGRICULTURE, FOREST SERVICE (USDA FS). 2005, Threatened, endangered and sensitive plants survey: field guide. Washington, DC. Website: <http://fs.fed.us/r6/sfpnw/issssp/documents/inventories/inv-sp-tesp-survey-field-guide-2005-03.doc> [accessed December 1, 2011].